CLAIMS

1. Field emission device, comprising:

- a cathode (22, 30),

- an insulating layer (26, 36), comprising open zones (40),

- a conductive layer (28, 38, 48), called a gate layer, comprising at least one layer (45) of catalyst material for forming electron emitters and at least one layer (48) of a conductive material not catalysing the formation of electron emitters,

- electron emitters (29), in open zones (40)of the insulating layer and the gate layer.

2. Device according to claim 1, each insulating layer being a porous zone, the open zones (40) of the insulating layer being pores of this layer.

3. Device according to claim 1 or 2, a resistive layer (24, 32) being arranged between the cathode and the insulating layer.

4. Device according to one of claims 1 to 3, the electron emitters being constituted by nanotubes (29) or nanofibres.

5. Device according to one of claims 1 to 4, the electron emitters being made of carbon.

6. Device according to one of claims 1 to 4, the electron emitters being made of a metallic material.

7. Device according to claim 6, the electron emitters being made of molybdenum or palladium.

8. Device according to one of claims 1 to 4, the electron emitters being made of an emitting semiconductor material.

9. Device according to claim 8, the electron emitters being made of silicon.

10. Device according to one of claims 1 to 9, the insulating layer being made of alumina.

11. Device according to one of claims 1 to 10, the open zones or the pores having a diameter between 5 nm and 25 nm.

12. Method for producing a field emission device, comprising:

- the formation of a cathode (22, 30),
- the formation of an insulating layer (26, 36), comprising open zones (40),
- the formation of a conductive layer (28, 38, 48), called a gate layer, comprising at least one layer (45) of catalyst material for forming electron emitters and at least one layer (48) of a conductive

material not catalysing the formation of electron emitters,

- the formation of electron emitters (29), in open zones of the insulating layer and the gate layer.

13. Method according to claim 12, the insulating layer being porous, the open zones (40) of the insulating layer being pores of this layer.

14. Method according to claim 12 or 13, further comprising the formation of a resistive layer (24, 32), between the cathode and the insulating layer.

15. Method according to claim 14, the resistive layer being made of amorphous silicon.

16. Method for producing a field emission device, comprising:

- the formation of a cathode (122, 222, 322),

- the formation of a first insulating layer (124, 224, 324), then a gate layer (128, 228, 328),

- the formation of a second insulating layer (126, 226, 326) and open zones (140, 240, 349) in said second insulating layer,

- the etching of the gate layer and the first insulating layer, through open zones of the first insulating layer (126, 226, 326),

- the formation of electron emitters, on catalyst zones, exposed at the base of the etched zones of the first insulating layer.

17. Method according to claim 16, comprising the formation of a catalyst layer (134) prior to the formation of the first insulating layer (124).

18. Method according to claim 17, comprising the removal of the second insulating layer (126), before or after the formation of electron emitters.

19. Method according to claim 16, comprising the deposition, at least in the etched zones (240, 340) of the first insulating layer, of a catalyst material (244, 344), after etching of the gate layer (228, 328) and the first insulating layer (224, 324).

20. Method according to claim 19, further comprising the removal of the second insulating layer (226), after deposition of the catalyst material.

21. Method according to claim 19, further comprising the removal of the second insulating layer (326), before deposition of the catalyst material (332), then the deposition of the latter in the etched zones of the first insulating layer (324) and on the non-etched zones of the gate (328).

22. Method according to claim 21, further comprising the formation of a metallic layer (330) on the catalyst layer (332) deposited on the gate.

23. Method according to one of claims 16 to 22, the second insulating layer being a porous zone, the open zones being pores of this layer.

24. Method according to one of claims 16 to 23, a resistive layer, for example of amorphous silicon, being arranged on the cathode (122, 222, 322).

25. Method according to one of claims 12 to 24, the emitters being nanotubes or nanofibres.

26. Method according to claim 25, the nanotubes being obtained by pure catalytic growth or with RF plasma.

27. Method according to one of claims 25 or 26, the emitters being made of carbon.

28. Method according to one of claims 12 to 25, the electron emitters being obtained by electrochemical deposition of an emitting metal.

29. Method according to one of claims 12 to 28, the insulating layer, or the second insulating layer, being produced from an aluminium layer.

30. Method according to claim 29, the open zones or the pores being produced by anodisation of the aluminium layer.

31. Method according to one of claims 12 to 30, the cathode being made of titanium nitride (TiN), or molybdenum, or chromium or tantalum nitride (TaN).

32. Method according to one of claims 12 to 31, the catalyst being made of nickel, or iron or cobalt or an oxide of these materials.